REMARKS

This Amendment is responsive to the Final Office Action dated October 24, 2005. Applicants have amended claims 1-3, 5, 7, and 17-19. Applicants have also added new claims 28-30. Claims 1-30 are pending upon entry of the Amendment.

Entry of Amendments

Applicants respectfully request entry of the amendments to claims 1-3, 5, 7 and 17-19 as indicated above. Applicants believe that these amendments will place the application in condition for allowance, or in better form for appeal. The proposed amendments do not raise new issues, and should not require any additional search by the Examiner. Applicants also request entry of new claims 28-30. Antecedent basis for the amendments to the claims is provided in the specification at page 5, paragraph 2, page 6, paragraph 3-4, page 9, paragraph 3, Examples 1C, 2, 3, and 4C, and originally filed claims 18 and 19.

Claim 1 has been amended, and independent claim 30 has been added, to clarify how the composite front side Tg may be determined using the Fox equation. Claims 2-3, 5, 7 and claim 17 have been amended to clarify the relationship between a "hard" and "soft" resin in terms of the relative glass transition temperatures of the resins recited in originally filed claims 18 and 19. Claims 18 and 19 have been amended to add the omitted term "component" to provide the proper antecedent reference to the terms "hard resin component" and "soft resin component" in claim 17. New claims 28-30 have been added to more clearly claim embodiments described in Examples 2 and 3, and to more clearly distinguish the claimed invention from the Comparative Examples 1C and 4C.

In particular, independent claim 1 has been amended to incorporate a limitation that the lower support layer binder system Tg is at least about 60°C as calculated using the Fox equation. The Fox equation is well known in the art.[1] Information that is known to those of ordinary skill in the art at the time of filing the patent application may be read into the specification to show

[1] *See e.g.* U.S. 6,037,037 to Kubota *et al.* at Col. 3, lines 29-32 (art of record cited by the Examiner and describing calculation of the glass transition temperature for a binding resin comprising at least two resins as the weight harmonic average of the glass transition temperatures (absolute temperatures) of the resins). *See also* U.S. 6,774,161 B2 to Hashemzadeh *et al.*, Col. 3, lines 33-45 (providing the general form of the Fox equation for calculating a composite T_g).

that one skilled in the art would have been able to make and use the claimed invention using the disclosure as a guide.[2]

Applicants respectfully direct the Examiner's attention to the fact that U.S. 6,037,037 (Kubota *et al*). teaches calculation of glass transition temperatures of first and second binding resins using the Fox equation:

$1/Tg_{layer} = w_1/Tg_1 + w_2/Tg_2$

wherein Tg_{layer} is the layer Tg calculated using the Fox equation, and w_1 and w_2 are weight fractions of resin 1 and resin 2, respectively (i.e. $w_1 + w_2 = 1$).[3] Using the known glass transition temperatures and parts by weight of the binder resin components provided by Examples 1C, 2, 3 and 4C, the Fox equation was used to calculate the composite Tg for the upper layer and support layer binder systems. The results are summarized in the following Table:

			Binder Weight Fractions							
			(Comparative) Example 1C		Example 2		Example 3		(Comparative) Example 4C	
Binder	Tg(°C)	Tg(°K)	Upper Layer	Lower Layer	Upper Layer	Lower Layer	Upper Layer	Lower Layer	Upper Layer	Lower Layer
K32 (hard)	100	373.15	0.4972	0.4997	0.4972		0.6646		0.6546	0.5143
UR7300 (soft resin)	23	296.15	0.5028	0.5003	0.5028		0.3354		0.3364	0.4857
BL16 (hard resin)	84	357.15				0.5999				
UR7525 (soft resin)	40	313.15				0.4001		0.3326		
CA-151HT (hard resin)	79	352.15						0.6674		
			Binder System Tg Calculated Using the Fox Equation							
Upper magnetic layer binder system Tg (°C)			56.9		56.9		70.1		70.1	
Lower support layer binder system Tg (°C)				57.1		65.0		65.0		58.2

Note that the binder component weight fractions for each binder system comprising each layer may be readily calculated using the disclosed parts by weight for each binder component in each Example. For example, the weight fraction for the hard resin component (K32) of the upper magnetic layer in Comparative Example 1C may be calculated from the disclosed parts by weight of all of the resin components of the upper magnetic layer (K32 hard resin = 0.90 parts by weight; UR7300 soft resin = 0.91 parts by weight) as follows:

$0.9/(0.9 + 0.91) = 0.4972$

Note that the glass transition temperatures of the lower support layer binder systems calculated using the Fox equation are 57.1°C and 58.2°C for Comparative Examples 1C and 4C, respectively. Both Comparative Examples, with calculated lower support layer binder system Tg less than 60°C, exhibited edge cracking. In addition, the glass transition temperatures of the

[2] *See In re Brandstadter*, 179 U.S.P.Q. 286 (CCPA 1973); *See also In re Howarth*, 210 U.S.P.Q. 689 (CCPA 1981).
[3] *Id.*

lower support layer binder systems calculated using the Fox equation are 65.0 and 65.0 for Examples 3 and 4, respectively. Both examples, with calculated lower support layer binder system Tg greater than 60°C, did not exhibit edge cracking, as recited by amended claim 1. Example 3, with a lower support layer binder system Tg of at least about 60°C and less than the magnetic upper layer binder system Tg, provides support for the amendment to claim 1. Both examples further illustrate a lower support layer binder system Tg of at least about 65°C, and from about 65°C to about 72°C, as required by new claims 28 and 29. Moreover, Example 2 illustrates an example wherein the lower support layer binder system Tg is not less than the Tg of the magnetic upper layer binder system, but wherein the lower support layer binder system Tg is greater than 60°C, as required by new claim 30.

Applicants submit that the proposed claim amendments are completely supported by the disclosed Examples, as illustrated by Table 1 and the calculations used to generate Table 1 according to information that is known to those of ordinary skill in the art at the time of filing the patent application, for example, from the cited *Kubota et al.* reference. Applicants respectfully request entry of the amendments to claims 1-3, 5, 7, and 17-19. Applicants further respectfully request entry of new claims 28-30.

Claim Rejection Under 35 U.S.C. § 112

In the Final Office Action, the Examiner rejected claims 2-10, 17-24 and 27 under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which Applicants regard as the invention. Applicants respectfully disagree with the Examiner's assertion that the term "Tg of the composite front side" is indefinite, as claim 2 recites that the "Tg of the composite front side is greater than 80°C." The claim clearly recites a single Tg value. A person of ordinary skill in the art would understand that a single Tg value for a resin could be obtained by measurement (for example, using differential scanning calorimetry) or by calculation using the Fox equation.[4] A person of ordinary skill in the art would further recognize that the preferred way to obtain a single Tg value representative of a composite polymer blend would be to calculate the Tg value, since, as pointed out by the Examiner in citing U.S. 6,811,855 (the Ohno patent), some particular polyurethane resins may exhibit multiple glass transition temperatures when measured using viscoelastic

[4] *Id.*

measurement methods.[5] Applicants also respectfully disagree with the Examiner's assertion that the terms "hard" and "soft" resin are indefinite. A person of ordinary skill in the art would further understand that these are relative terms used to describe the comparative magnitudes of glass transition temperatures for two resins.[6]

However, to improve the clarity of the claims, Applicants have amended claim 1 to incorporate a limitation that the lower support layer binder system Tg is at least about 60°C as calculated using the Fox equation. Applicants have also amended claim 1 to clarify that the Tg of the lower support layer binder system may be calculated using the Fox equation," as known to a person of ordinary skill in the art.[7] Claim 2 has been amended to remove the limitation to a Tg of the composite front side. Claims 3, 5, 7, and 17 have also been amended to incorporate limitations to a relative Tg relationship for purposes of clarification. New claims 28-30 have been added. Claims 4, 6, 8-16, and 18-29 depend upon the amended claims. Claim 30 is a new independent claim that replaces the limitation that the Tg of the lower support layer binder system is less than the Tg of the upper magnetic layer binder system with a limitation that the Tg of the lower support layer binder system is at least about 60°C as calculated using the Fox equation. Applicants submit that each of the claims 1-30, as currently amended, particularly points out and distinctly claims the subject matter, as required by 35 U.S.C. 112, second paragraph.

As a threshold matter, Applicants respectfully disagree with the Examiner's characterization of Applicants' response to the Office Action dated May 2, 2005 as stating that that "Tg of the composite front side...is not an average of all layers **but a measurable quantity**." Applicants made no statement or admission that the Tg must be measured. Applicants clearly stated in that response that "[t]he composite Tg is thus the combined Tg exhibited by the combined layers comprising the front side. As known to those skilled in the art, this composite Tg **may** be measured (e.g. by differential scanning calorimetry). The limitation in claim 2 that the Tg of the composite (combined) front side is greater than about 80°C thus clearly does not describe the Tg of just the magnetic layer, an average of any magnetic layer, or even an

[5] *See* U.S. 6,811,855 to Ohno at Col. 11, lines 48-63 (art of record cited by the Examiner).
[6] *See* U.S. 5,510,187 to Kumar *et al.* at Col. 1, lines 52-58 (art of record cited in Applicants' IDS)); *See also* U.S. 5,501,903 to Erkkila *et al.* at Col. 2, lines 53-54 and Col. 3, lines 2-5 (art of record cited in Applicants' IDS).
[7] *See* Kubota *et al.* at Col. 3, lines 29-32

average of all layers on the front side as asserted by the Examiner." Nowhere in that response did Applicants assert that the Tg recited in Applicants' claims is a measured Tg.

In addition and notwithstanding the Examiner's reference to the Ohno patent and its teaching of certain polyurethane resins exhibiting multiple glass transition temperatures as measured using certain viscoelastic methods, Applicants respectfully assert that claim 1, as currently amended, makes clear that the lower support layer binder system Tg is a single Tg value calculated using the Fox equation in a manner analogous to that described in the art of record.[8] Thus, claim 1 as currently amended cannot be indefinite in view of the Kubota *et al.* reference, which is part of the art to which Applicants' invention pertains, and which provides a teaching of calculating a single composite Tg for a composite resin system using the geometric mean of the weight fraction weighted absolute glass transition temperatures of the component binders resins (i.e. using the Fox equation).[9]

Furthermore, with respect to the terms "hard" and "soft" resin, Applicants respectfully disagree with the Examiner's assertion that the terms "hard" and "soft" resin are not clearly defined. As a threshold matter, Applicants respectfully disagree to the Examiner's characterization of Applicants' response to the Office Action dated May 2, 2005 as attempting to define "hard" and "soft" relative to threshold Tg values of greater than 70°C and less than 60°C, respectively. Nowhere in that response did Applicants state that a soft resin must have a Tg less than about 60°C, and a hard resin must have a Tg greater than about 70°C.

On the contrary, Applicants clearly stated in the response to the May 2nd Office Action that "the terms "hard" and "soft" are qualitative terms that properly establish the **relative** hardness of two resins in a layer." Applicants went on to state that "[f]urthermore, **in one preferred embodiment**, the relative hardness or softness of two resins in the support layer is further defined in terms of the respective glass transition temperatures of the resins. **For this preferred embodiment**, the specification at page 6, paragraph 4, states: 'The soft resin has a Tg of less than about 60°C, preferably less than about 50°C. The hard resin has a Tg of at least about 70°C, preferably at least about 80°C.'" Applicants respectfully assert that the Examiner is improperly attempting to import a limitation describing certain preferred embodiments in the

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[8] *Id.*
[9] *Id.*

specification to limit the scope of the claims as determined by the plain meaning of the claim language to one skilled in the art to which the invention pertains.

Applicants further assert that one skilled in the art would have understood that the terms "hard " and "soft" are used to describe the relative glass transition temperatures of binder systems, with a "soft" resin exhibiting a Tg less than a "hard" resin. For example, in U.S. 5,510,187 (the Kumar patent), the following statement appears in the Background section: "The polymeric binders of magnetic recording media are most commonly prepared from polymer blends comprising a hard component, i.e., a polymer with relatively high glass transition temperature and modulus, and a soft component, i.e. a polymer with relatively low glass transition temperature and modulus."[10] In addition, in U.S. 5,501,903 (the Erkkila patent), the following statements appear: "Thus, binders in magnetic media generally comprise both a soft resin and a hard resin. The presence of a hard resin having a higher glass transition temperature ("Tg"), compared to the low Tg urethane, also provides for improved thermal stability."[11] Clearly the terms "hard" and "soft" with respect to polymeric binders or resins have acquired clear and unambiguous meaning as terms of art within the field of magnetic recording media, requiring no explicit definition within Applicants' specification.

In addition, Applicants' specification provides support for this common meaning of the terms "hard" and "soft" at page 6, last paragraph, wherein the soft resin is described as having a Tg less than about 60°C, and a hard resin is described as having a Tg of at least about 70°C. Implicitly, the soft resin has a Tg less than the Tg of the hard resin. Furthermore, originally-filed dependent claims 18 and 19, which are part of the specification, implicitly support Applicants' assertion that a "soft" resin has a Tg less than that of a "hard" resin, and further explicitly characterizes the Tg values as differing by at least about 2°C for that particular claimed embodiment.

One of ordinary skill in the art would also have understood that a single resin component exhibits a single Tg that may be measured using differential scanning calorimetry (not viscoelastic methods which may measure multiple glass transitions as taught by the Ohno patent)

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[10] *See* Kumar *et al.* at Col. 1, lines 52-58 (art of record in which the Examiner was the Primary Examiner of record).
[11] *See* Erkkila *et al.* at Col. 2, lines 53-54 and Col. 3, lines 2-5 (art of record in which the Examiner was the Primary Examiner of record).

or calculated (e.g. from monomer values provided for homopolymers as described in the Polymer Handbook, 2nd Ed., J. Wiley & Sons, New York (1975)), and that this Tg may vary by a few degrees Kelvin depending on the method of determination. Furthermore, use of words of approximation (such as "about") is permissible in the specification and claims, where one of ordinary skill in the art, in view of the prior art and the status of the art, will understand the term; or where, as here, Applicants have provided a standard or definition in the prosecution history.[12]

Applicants also respectfully disagree with the Examiner's assertion that Applicants' decision to set forth definitions for certain terms in the specification in a separate listing of definitions imposes a presumption that all terms of art used in the specification must be similarly defined. In the Final Office Action, the Examiner asserted that Applicants' omission of definitions for the terms "hard" and "soft" in the specification at pages 3 and 4 is *prima facie* evidence that a "hard" or "soft" resin is not defined by the Tg. The Examiner cites no case law or rule to support this assertion, which is clearly erroneous. To impose a requirement that applicants for a patent define every term of art used within the specification in a separate definitions section if they choose to define a single term of art in a listing of definitions imposes a burden on the patentee beyond that contemplated by the patent statute (35 U.S.C. *et seq.*), by the rules governing patent prosecution (37 C.F.R. *et seq.*), or by the published guidelines for patent examination provided by the MPEP.

Nevertheless, in the interest of advancing prosecution, Applicants have amended dependent claims 3, 5, and 7 to clarify that the recited "hard" resin components for each particular claimed embodiment have a relative glass transition temperature greater than a recited "soft" resin component. Dependent claim 17 has been amended to clarify that the "hard" resin has a Tg at least about 2°C greater than a Tg of the "soft" resin component for the particular embodiment of claim 17. Claims 4, 6, 8-10, and 18-22 depend upon the amended dependent claims.

As noted previously, Applicants have also amended claim 1 to incorporate the limitation that the lower support layer binder system Tg is at least about 60°C as calculated using the Fox equation. Claims 1-29 depend upon the amended independent claim. Claim 30 is a new independent claim that recites the limitation that the lower support layer binder system Tg is at

[12] *See Viskase Corp. v. American National Can Co.*, 59 U.S.P.Q. (BNA) 1823 (Fed. Cir. 2001).

least about 60°C as calculated using the Fox equation. Applicants submit that each of the claims 1-29, as currently amended, particularly points out and distinctly claims the subject matter, as required by 35 U.S.C. 112, second paragraph. Withdrawal of the rejection of all claims under 35 U.S.C. 112, second paragraph, is respectfully requested.

Claim Rejection Under 35 U.S.C. § 103

In the Final Office Action, the Examiner rejected claims 1, 3, 5-7, 9-17 and 19-27 under 35 U.S.C. 103(a) as being unpatentable over Kubota *et al.* (US 6,037,037). Without conceding any arguments related to the Examiner's burden of establishing a *prima facie* case of obviousness sufficient to shift the burden to the Applicants, thereby preserving this issue for appeal, Applicants respectfully traverse the rejection to the extent such rejections may be considered applicable to the claims as amended. The applied reference fails to disclose or suggest the inventions defined by Applicants' claims, and provide no teaching that would have suggested the desirability of modification to arrive at the claimed invention.

With reference to independent claim 1 as amended, for example, the applied reference lacks any teaching that would have suggested that the non-magnetic lower support layer binder system Tg should be at least about 60°C as calculated using the Fox equation. Kubota *et al.* teach "[t]he non-magnetic layer comprises...a first binding resin having a glass transition temperature (Tg_1) of 30 to 50°C." Kubota *et al.* further teach "...**the glass transition temperatures (Tg_1, Tg_2) of the binding resins of the layers are in the respective ranges as described above** [emphasis added], and the two glass transition temperatures have the relationship as described above..." "When each binding resin comprises at least two resins, the glass transition temperatures (Tg_1, Tg_2) are calculated based on the weight harmonic average of the glass transition temperatures (absolute temperatures) of the resins."[13] It is thus a mathematical impossibility for Kubota *et al.* to have taught or suggested that the non-magnetic lower support layer binder system Tg should be at least about 60°C as calculated using the Fox equation, as presently claimed in Applicants' invention.

[13] Kubota *et al.* at column 3, lines 23-32

It is well established that the Examiner bears the burden of establishing a prima facie case of obviousness.[14] In doing so, the Examiner must determine whether the prior art provides a "teaching or suggestion to one of ordinary skill in the art to make the changes that would produce" the claimed invention.[15] A *prima facie* case of obviousness is established only when this burden is met. Applicants respectfully contend that the Examiner has failed to meet this burden.

The Court of Appeals for the Federal Circuit recently addressed the evidentiary standard required to uphold an obviousness rejection.[16] Deficiencies in the evidentiary record cannot be cured by general conclusions such as "general knowledge" or "common sense."[17] Accordingly, the Examiner cannot rely on unsupported, conclusory statements to close holes in the evidentiary record.[18] Unless the Examiner can establish an evidentiary record based on concrete prior art references that establish that it would have been obvious to a person with ordinary skill in the art to incorporate the features of Applicants' dependent claims, the claims should be allowed.

Furthermore, the Examiner has utterly failed to identify in Kubota *et al.* a motivation to provide a dual-layer magnetic recording medium according to Applicants' presently claimed invention. Specifically, there is no teaching of a non-magnetic substrate having a front side and a back side, at least one lower support layer formed over the front side and at least one magnetic upper layer formed over said at least one lower layer, said lower support layer comprising at least one non-magnetic pigment and a binder system therefore, wherein said lower support layer binder system has a Tg of at least about 60°C as calculated using the Fox equation. Nor has the Examiner cited any additional references to combine with Kubota *et al.* to provide a teaching of Applicants' claimed invention.

Furthermore, the Examiner has identified no motivation found within the prior art that would have led a person of ordinary skill in the art to provide a lower support layer binder system has a Tg of at least about 60°C as calculated using the Fox equation in a dual layer magnetic recording medium according to Applicants' claimed invention. Applicants' invention is directed, in some embodiments, to a dual-layer magnetic recording medium having two edges and

[14] *In re Oetiker*, 24 U.S.P.Q.2d 1443, 1445 (Fed. Cir. 1992).
[15] *In re Chu*, 36 U.S.P.Q.2d 1089, 1094 (Fed. Cir. 1995).
[16] *In re Lee*, 61 U.S.P.Q.2d 1430, (Fed. Cir. 2002).
[17] *Id.*

exhibiting substantially less cracking on the edges when compared to an otherwise identical dual-layer magnetic recording medium comprising a magnetic upper layer and a lower support layer having substantially identical binder systems. Kubota *et al.* do not describe the problem of edge cracking anywhere in their disclosure. Indeed, the term "edge cracking" is not even used in the disclosure of Kubota *et al.* The Examiner has failed to explain why one of ordinary skill in the art would have looked to the magnetic and non-magnetic layers of Kubota *et al.* and sought to modify the first binder resin system used in the non-magnetic layer to have a Tg outside of Kubota *et al.'s* disclosed range of 30-50°C, as presently claimed in Applicants' independent claim 1.

The Court of Appeals for the Federal Circuit has made clear that motivation for making the claimed invention must be found in the prior art, and that it is impermissible hindsight for the Examiner to use the motivation stated in Applicants' own disclosure as a blueprint to reconstruct the claimed invention from the prior art.[19] It is improper to point to teachings of motivation contained within Applicants' own disclosure.[20] Moreover, it is insufficient to merely pull such motivation out of thin air. Rather, the Examiner's rejection must be based on substantial evidence in the record demonstrated that the motivation for making the claimed invention resides in the prior art.[21]

In summary, the Examiner's conclusion of obviousness is unsupported by any substantial evidence in the record. For at least these reasons, the Examiner has failed to establish a *prima facie* case for non-patentability of Applicants' claims 1-27 under 35 U.S.C. 103(a). New claims 28-30 are likewise non-obvious in view of the cited *Kubota et al.* reference, as the new claims require that the Tg of the lower support layer binder system (calculated using the Fox equation) lie above the required 30-50°C range disclosed by *Kubota et al.* Withdrawal of this rejection is respectfully requested with respect to all claims.

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[18] *Id.*
[19] *See Interconnect Planning Corp. v. Feil*, 227 U.S.P.Q. 543 (Fed. Cir. 1985); *see also In re Fine*, 5 U.S.P.Q.2d 1596, 1598 (Fed. Cir. 1988); *see also In re Gorman*, 18 U.S.P.Q.2d 1885, 1888 (Fed. Cir. 1991); *see also Al-Site Corp. v. VSI International, Inc.*, 50 U.S.P.Q.2d 1161, 1171 (Fed. Cir. 1999).
[20] *In re Oetiker*, 24 U.S.P.Q.2d at 1445.
[21] *In re Lee*, 61 U.S.P.Q.2d 1430, 1433 (Fed. Cir. 2002); *In re Chu*, 36 U.S.P.Q.2d at 1094.

CONCLUSION

All claims in this application are in condition for allowance. Applicants respectfully request reconsideration and prompt allowance of all pending claims. Please charge any additional fees or credit any overpayment to deposit account number 09-0069. The Examiner is invited to telephone the below-signed attorney to discuss this application.

Date: 1/17/06

By: Eric D. Levinson

Imation Legal Affairs
P.O. Box 64898
St. Paul, Minnesota 55164-0898
Telephone: (651) 704-3604
Facsimile: (651) 704-5951

Name: Eric D. Levinson
Reg. No.: 35,814